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ABSTRACT

The Regional Interstate Planning Project (RIPP) is composed of representatives from ten state departments of education who meet periodically to discuss topical educational issues of general concern. RIPP member states include Idaho, Montana, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico, Texas, and Oklahoma. This pariticular booklet reports on a RIPP seminar on educational management information systems, which was held July 1-3, 1975 in Helena, Montana. The report consists mainly of edited transcripts of various presentations made at the seminar. Titles of the presentation include: "Adequate, Accurate, and Timely Information in Educational Decision-Making," "The National Center for Educational Statistics: New Mandates, Different Functions," "MIS, IMS, and EMIS--Cooperative but not Identical Systems," "Assessing Information Services in the SEA," "EMIS Development--Pitfalls and Admonitions," "The Concept of System Evaluation," "Establishing an Information System in a State Department of Education," "Up from the Basement: The Perspective of the Data Processor," and "Data as the Center of the Universe." (JG)

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REGIONAL INTERSTATE PLANNING PROJECT PROGRAM . . .

VOL. IV

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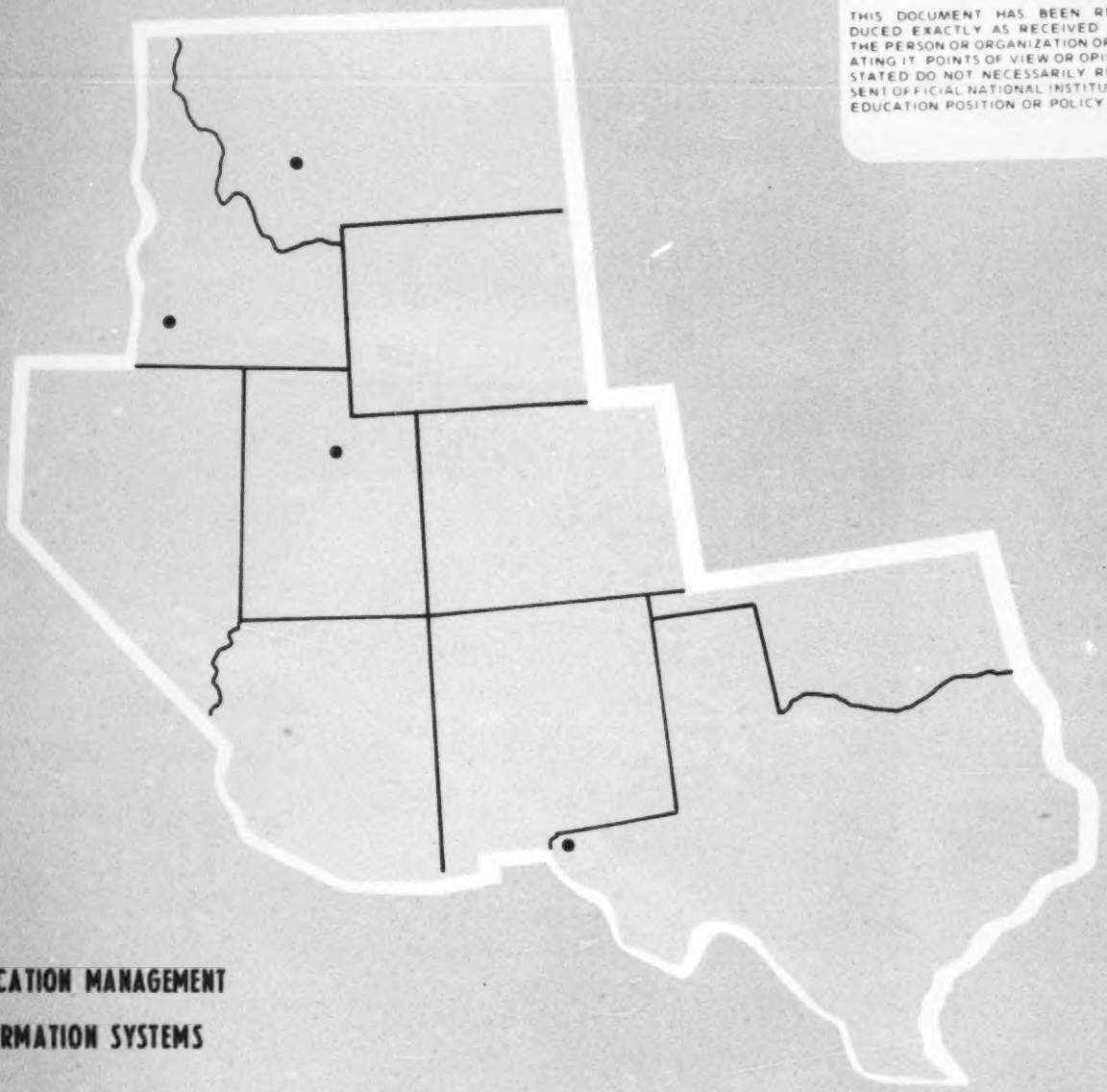

EDUCATION MANAGEMENT INFORMATION SYSTEMS

SEMINAR REPORT

HELENA, MONTANA
JULY 1, 2, AND 3, 1975

NEVADA DEPARTMENT OF EDUCATION
KENNETH H. HANSEN, Superintendent

EA 009 749

REGIONAL INTERSTATE PLANNING PROJECT

HELENA, MONTANA

July 1, 2, 3, 1975

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An ESEA Title 5, Section 505, Project

FOREWORD

How do State departments of education improve their total Educational Management Information Systems? How do they satisfy the informational needs of the various groups and individuals whose educational requirements must be identified and satisfied? How do State departments of education staff use a total information system to make educational decisions? To help us gain insight into these problems the R.I.P.P. consortia of states held a seminar in Helena, Montana, to explore the state-of-the-art of Educational Management Information Systems, utilizing the greatest possible input from the ten State departments of education participating in the project. Each State was to be represented by a team consisting of staff from three levels, top management or policy making, State EMIS director or administrator, and EMIS analyst or technician.

To plan the conference a committee of representatives from four of the States was assigned the responsibility of developing the program. Dr. Kay Palmer, Management Information System administrator from the Nevada Department of Education, was picked to head up the planning committee, which consisted of Dr. Charles Sisson, Colorado; Donald H. Offerman, Texas; Dr. Richard Maxfield, and Dr. Don K. Richards of Utah.

The committee chose Dr. Kenneth H. Hansen, State Superintendent of Public Instruction, Nevada, to keynote the conference. Dr. Hansen emphasized the State department of education's role in the development and utilization of a total Management Information System. The need to use a team approach when defining terms, establishing priorities, and problem solving. Dr. Hansen set the stage for the State committees who met together for the remainder of the conference after each presentation.

Dr. Walter D. Talbot, Superintendent of Public Instruction, Utah, led the Utah team in making the presentation on Policy Issues. During the presentation, participants were informed of their responsibilities in the following areas:

-Understanding what an EMIS is and is not
-Establishing a need for EMIS
-Establishing EMIS as a priority based upon need
-Making necessary resources available
-Providing active support for EMIS
-Establishing necessary organization plan for EMIS development
-Defining the EMIS

Dr. James Mitchell, Associate Superintendent, Planning and Management Information Branch, Department of Public Instruction, State of Iowa, presented the Data Collection Issues, which covered the following:

-Need identification and verification
-Determination of data elements to be collected
-Development of a forms management system
-Form design
-Collection techniques
-Data definitions
-Compatability with federal data requirements

Data Processing Issues were presented by the Texas Educational Agency. Thomas M. Nies, President of CINCOM Systems, Inc. from Cincinnati, assisted the team in covering the following.

-Managing data as a resource
-Data base management vs. application oriented programs
-Developmental strategies
-Standards of software and hardware comparability and compatability
-Standards of documentation
-Importance of training personnel in data processing and management skills

The Colorado State Department personnel led the discussion on Data Utilization Issues with Dr. Ed Steinbrecher and Dr. Charles Sisson introducing the topic. They were assisted by Joseph Movizzo, Program Administrator, Educational Industry Marketing, IBM Corporation, Bethesda, Maryland. The following areas were covered during this presentation:

-Data as a resource
-Accessibility of data
-Data security
-Translating data into information
-Data dissemination
-Interpreting information

Luncheon speakers at the Seminar were Verl Snyder, Director of State Relations, U. S. Office of Education, and Dr. Alpheus L. White, Director, Division of State Assistance, U. S. Office of Education.

At these sessions we were informed about what is happening regarding education on Capitol Hill and an overview of Public Law 93380, Title IV.

The information contained in this publication is a result of discussions that took place as outlined in this document. Cooperative planning and discussion that takes place during these conferences are a great asset to the State departments of education involved. We are finding solutions to major educational problems as we transcend State lines and share our thinking. We are grateful to the U. S. Congress and the U. S. Office of Education for making the funds available to conduct these seminars.

I would like to thank each of the State coordinators for their assistance in planning and conducting during the sessions. A special thanks to Dolores Colburg, Superintendent of Public Instruction, Montana, and Dr. Harold Rehmer for making the local arrangements and conducting the Seminar Evaluation; also for the warm hospitality extended to us while visiting in Montana.

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INTRODUCTION

The Regional Interstate Planning Project participants meet periodically at conferences sponsored by ten State departments of education to discuss new or topical issues of general concern. The most recent meeting was held July 1-3, 1975 in Helena, Montana, to discuss the implications for education of information systems--MIS, IMS, and EMIS.

The R.I.P.P. Conferences are financed with funds provided under the Elementary and Secondary Education Act of 1965, Public Law 89-10, Title V, Section 505 as amended. The project is administered by the Nevada State Department of Education under the supervision of Dr. Kenneth H. Hansen who serves as Chairman of the Policy Board. Other cooperating State departments of education are Arizona, Colorado, Idaho, Montana, New Mexico, Oklahoma, Texas, Utah, and Wyoming.

The retention of the same cover design for each of the first three volumes of the R.I.P.P. proceedings has caused some conference members to believe they were receiving the same document. Consequently the cover of this Volume 4 was changed to a conspicuous blue.

During the process of transcribing, editing, and compiling the R.I.P.P. proceedings, the editors have sought to keep the material both brief and informative. The resulting report is, hopefully, a useful record of many thoughtful discussions.

Dr. Jake Huber, Co-Editor
Dr. Evalyn Dearmin, Co-Editor
Research and Educational Planning Center
College of Education
University of Nevada, Reno
Reno, Nevada

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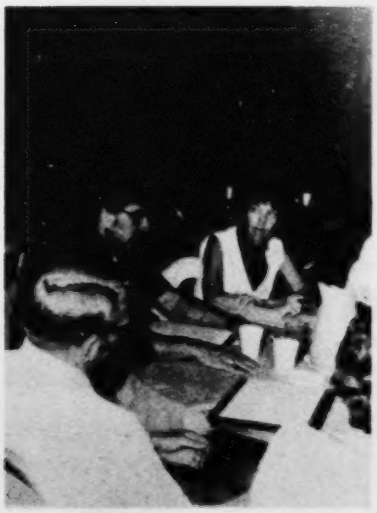
Jake Huber and Al White
"Reviewing RIPP Report"

The Oklahoma State Delegation
"at work"

Ed Steinbrecher (Colorado SDOE)
and
Joe F. Movizzo (Maryland IBM)



Beverly Wheeler
Arizona RIPP Coordinator
and
Charles Sisson
Colorado ESEA

Chief State School Officers:
Walter Talbot (Utah)
Dolores Colburg (Montana)
Kenneth Hansen (Nevada)

Nevada Participants

The RIPP Participants
"listen to the keynote address
given by Kenneth H. Hansen"

The Utah Team

James Mitchell
Iowa State Department
of Education

Harold Rehmer
Montana RIPP Coordinator
and staff

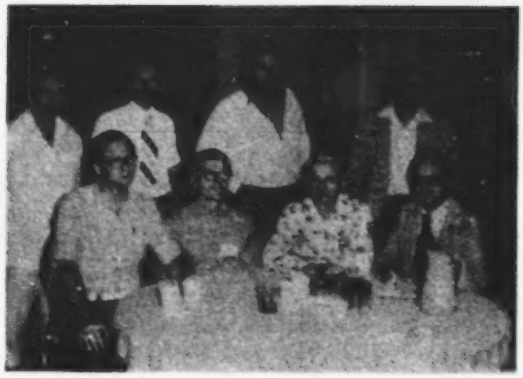
Helpmates from U.S.O.E.
Al White, Kathy Wallhan, Verl Synder

Registration in Montana at
the RIPP Seminar
"was a pleasant task"

Texas Delegation
"at a planning session"

Tom Nies
CINCOM Systems, Ohio

Kay Palmer, Chairman
Planning Committee, EMIS Seminar
Nevada State Department of Education



L-R Row 1: Ted Sanders (NM), Charles Sandmann (OK), Harold Rehmer (MT), Don Richards (UT), Walter Howard (TX), L-R Row 2: Ed Steinbrecher (CO), John Madson (NV), and Harold Farley (ID)

Robb Shank, National Coordinator for the Interstate Projects (Wisconsin) and Gladys Dronberger, State Department of Education (Oklahoma)

(L to R) Donald Offerman (Texas), Don Richards (Utah), Charles Sisson (Colorado), Richard Maxfield (Utah) "Planning Committee EMIS RIPP Seminar"

Kenneth H. Hansen
Chief State School Officer
Nevada

INTRODUCTORY REMARKS
REGIONAL INTERSTATE PLANNING PROJECT

by

Dolores Colburg
Superintendent of Public Instruction
Montana Department of Education

Welcome to Montana and to this project conference. I hope it will be a stimulating conference, and moreover, I hope you will have a good time in Montana. I am especially pleased to see that we have people here from other than the Regional Interstate Planning Project--from Alabama; Nebraska; Minnesota; Illinois; Washington D. C.; and certainly from the United States Office of Education.

We have planned a trip for you on Wednesday evening through a scenic area of Montana just North of Helena called the Gates of the Mountains. Part of the Lewis and Clark Expedition went through this part of the country before they finally arrived at the coast. You might keep that in mind.

There are a number of us women here who have never considered ourselves token women. Speaking for the few that are in the audience, we are pleased to have all of you here, male chauvinists included. And we hope that through this conference and interaction, perhaps there may be a little consciousness raising in addition to some information sharing.

ADEQUATE, ACCURATE AND TIMELY[1]

by

Dr. Kenneth H. Hansen, Superintendent of Public Instruction
Nevada State Department of Education

LaMar called me one day and said, "I want to give your speech a title. What would you think of this?" And he said, "Adequate, Accurate and Timely Information in Educational Descision-Making."

I said, "LaMar, that is an awfully dull title. That is a title that will be even duller than my speech. Couldn't you change it?"

He said, "Well, that's what we want you to talk about."

I said, "Well, couldn't you put part of it in a footnote?" I didn't think the footnote was going to come out quite the way it did.

Our conference topic today, educational management information systems, is itself a bit misleading because these are much more than management information systems. The very term "management," unfortunately, has come to sound somewhat stuffy, and pedantic, and routine. Because management implies a concern simply with keeping the agency running--whether it is an SEA, or LEA, or as in the State of Texas, the intermediate kind of system that is somewhere between the State and the local level--"management" does sound routine and stuffy. What we are concerned with are management systems in the very broadest sense--those information systems that not only help us to manage the pedestrian ends of keeping things going, but also help us address ourselves to solving the major problems in education, and to explicating or making clear our major purposes and goals, setting forth with utmost clarity our major priorities.

From a generalized management viewpoint, rather than from a specialized management viewpoint so appropriate to those of my colleagues who work directly with educational management information systems, it appears to me that if we want adequate, accurate, timely data, we want them not because we are interested in a system, even though the systems approach is integral to what we are going to discuss the next two or three days. We want adequate, accurate, and timely data because they are desperately needed to help us solve some major problems.

Let me identify just a few of them. The whole problem of reform of the school finance systems is bogged down today, not because we don't have enough complete or competing theories; it is bogged down at the application level because we don't have enough of the kinds of data we need. For example, we are still budgeting in a positively Neanderthal fashion, mostly by guess and by gosh.

One of the most astute critics of school finance systems, Tom James, the former Dean of Stanford, said in a speech not long ago that we can no longer afford to ignore what modern statistical and electronic technologies can tell us

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[1]Information in educational decision-making.

about the simple matter of budgeting. I know you don't like to be read to and I don't like to read to you, but in this little booklet from the editors of Planning and Changing called The Courts Seek Fiscal Neutrality in Education--a very fine little monograph--Tom James is quoted from a speech he made at the Education Commission of the States as saying this:

> *While the notion of full State controls of the total system of taxation needed to assemble the money for schools is equitable, sensible, and feasible; the notion of distributing it in equal amounts per pupil is not. The reasons are simple. First, we have used flat grants and later equalizing grants as arbitrary substitutes for knowledge we did not have--namely what was required for a given fiscal period to provide a child, or a classroom, or an attendance center, or a school district with the educational services required by each unit. No matter how you straighten out the matter of equity and taxation or method of distribution, it is at best dependent on very crude measures. Flat grants, or equalized grants, even--I am sorry to say--weighted grants depend a great deal on more or less educated guesses. We talk about so many dollars, equalized, or flat, or weighted per pupil, so many dollars per pupil, per unit, per district; but we don't really know how we came up with that dollar figure except that we are trying to divide what money there is with at least some semblance of equity.*

James goes on to say that it is propitious time to abandon these inadequate substitutes, for reorganization and technology make it possible to deal with facts in budget making. He speaks about the possibility of further reorganization of school districts as a result of implications at least of some court decisions and concludes this way:

> *With recent fantastic improvements in the technology of data processing and data reduction, there is no reason why we can't begin building budgets for elementary and secondary education in most states in the same way we have been doing for higher education: the statements of needs of children aggregated the classrooms, aggregated the attendance centers, school districts, and finally aggregated the statewide budget for schools to be presented to the legislature as is now commonly done for institutions of higher education.*

I don't like James' analogy. I think it shows that he spent his university years in a private institution. I don't think he knows how public higher education budgets really are made. Although he is using an analogy that may be false, his suggestion that we rely on new ways of gathering and treating educational data, that we aggregate up from needed expenditures, not only at the child level but also at the program level, on up through more and more complete aggregation of budget needs to a statewide level--that suggestion, I think, has real merit, because without the kind of data which Dean James points out so clearly we need, we still are budgeting largely by the seat of our pants.

If we cannot have, and I suppose we cannot, a completely disaggregated set of data as being envisioned in the complete program planning budget system, at least if we have the data, we could begin to figure out actual cost factors with a great deal more precision than is represented even in the more advanced equalization or weighted formulas now commonly in use. We need that data for the improvement of the budgeting part of our finance systems, and equally I

think, we need better data--district by district, state by state, even school by school--for the basic proposed reforms in finance systems.

I hope that we will have available to the State, as it has been proposed, money to start or continue the reform of finance systems. But with that money--that minimum of $100,000 per state that has been proposed--with that much money, we are not going to be able to do anything really constructive unless we have better data base at the local and State levels.

Now we do have some fine data bases; we are far ahead of most other countries. I have spent some time in about 25 of the emerging nations in Africa, working for the United States Department of State on some educational development problems in those countries. The worst problem of all in those countries was the complete lack of any kind of data base. In Sierra Leone, for example, I found that the agriculturalists had fine, up-to-date information on crop production, but when I went over to the administration of education, I could find nothing at all. They were still keeping all of their teacher and other school records by hand in yellow ledgers simply as one event happened and then another no alphabetizing, no chronology other than that which just eventuated. As something happened, it was just written down. There was no way of knowing how many teachers there were, when or where they were teaching, what their levels of preparation were or how many students they had. Now, we are better off than that.

Basically though, we can't use that $100,000 per State effectively in reforming school finance if we don't have more adequate, accurate, and timely data systems and data bases for our predictive work to determine what might be improved in school finance.

Some of the same things can be said of some of the major areas about which we must be increasingly concerned. Whatever you think of accountability, or however you define it, the concept of accountability is a lively one today. If we move past the mere concern of accountability that says we are going to give tests and report to the public how well schools are doing, move from that into the concern of accountability as embracing our planning and our programming efforts as well as our assessed evaluation reporting efforts; it is evident that at each stage in developing an accountability paradigm, we need to have the kind of data not yet available to us.

Now it is possible of course to think of accountability simply as a system for assessment evaluation reporting; but that is just the tail end of the system after you have done the planning and programming. A very annoying, but interesting book by Edward Wynn, The Politics of School Accountability, takes a very limited view of accountability. The author says that if this means reporting test scores to parents--and that is politically difficult in the educational system as we have it--he takes an extremely dim view of all administrators, which is possibly justified. But he points out over and over, with good and believable illustrations from States and districts, how even the reporting part of accountability is hampered because we don't have comparable kinds of data, so that what we do report really makes sense when it is disaggregated down to the school or individual level. We don't have the kind of data that does say whether or not the effort and expenditures of the school are really as productive as we would wish. If we are going to have a complete accountability system all the way through our initial program planning to our final assessment evaluation reporting, we need to have kinds of data on a systematic

basis that can be used for managing or, better yet, administering the entire program and still maintain enough flexibility to give what I think is proper autonomy and independence to the local unit as well as the State.

It would be fairly simple, for example, to impose a system on a State. It wouldn't be pleasant, but it could be done. As little power as SEA has, and as little clout as chief state school officers enjoy, it's possible to impose a statewide data collection system in the name of accountability and get by with it. Some States have, but I don't think that is the way to go at it. We need to have local districts developing data systematically enough to have enough commonality, so that they can be used at the State level rather than the State developing a system all by itself and imposing it downward.

Today I don't think any of us would take seriously the concept that we can evaluate teachers solely, or even primarily, on the basis simply of test performance of students. It's obvious that this is part of how you evaluate teachers and ultimately administrators, but only a part. What's the rest? We need to have all kinds of comparable data of actual longitudinal growth of students in many other ways--in their concepts, in their attitudes, in their own development of intellectual skills. But we need also to have the kinds of data relative to the background of the student--the social economic framework in which he grows up, his own intellectual and social capabilities when we started with him. Now to get these kinds of data into a system useable for managing, and ultimately evaluating the educational enterprise and the teachers and administrators responsible, we've got to have interrelated data of far greater complexity and completeness than we get just with anecdotal records, observations, and report cards. If we're really going to evaluate teachers and administrators, we need to have detailed materials at every step, broken down into measurable units. We need to have the expectations, the performance level, the outcomes all related to a common set of data bases that together give us a clear idea of teacher and administrator performance, and of course, student performance as well.

Until we find out more about what we expect of teachers and of students, how we expect the training sequence to develop, and how we determine that our expectations may have been in error, we're dragging another red herring across the trail of American education by exposing competency-based teacher education before we have the kind of data bases to make it work.

In at least three or four fields of major concern to those working with education, the almost shocking lack of adequate data bases for good educational management is apparent. Of course we say that ultimately we want education data management information systems so that we can make better educational decisions. But, I don't think the data is enough. Data has been seriously overrated as the key to decision making.

Remember that IBM ad of three or four years ago? A kind of Kennedyesque, foggy picture of an obviously harried executive, head down, walking along a stormy beach. And behind him the ad says: "IBM--we can't take that ultimate load of decision-making off your shoulders, but we can give you the data on which your decisions will be made." That's only part of the story. Decisions are made with much more than the more sophisticated data and the most compelling array of facts. Decision-making is simply one part of the administrative enterprise. Fortunately, the other parts are also reliant upon the kinds of data systems we have. If we assume that decision-making can never be done

in isolation, but must always be done as part of a total administrative process, we do not diminish the need for education management information systems. We just spread the need throughout the whole organization and throughout the whole administrative process. Data systems for better administrative decision-making, yes, but also for better goal setting, planning, organizing, coordinating, communicating, directing, and evaluating. The entire package needs the kind of data systems, integrated and interrelated, that are the concern of this conference.

Unfortunately, most decision-making, even with all the data at hand, is not done very well because we fail to distinguish between making decisions based on data and making decisions based on a whole cluster of kinds of input that are not normally subsumed under the title of data or management information data. Decision-making involves a complex understanding of organizational behavior. Two administrators could have the same complete data base, one of them make a decision unilaterally, the other make it finally after consultation with staff, and one decision would be better than another even though the data bases were identical. The point here is simply to caution us that if we are really interested in improving education, we also have to move beyond the formation of data systems into their better administration utilization--a move that takes us ultimately into a question of how people behave, how we value people, and how we let that value system affect our administrative judgment and our administrative behavior.

THE NATIONAL CENTER FOR EDUCATIONAL STATISTICS: NEW MANDATES, DIFFERENT FUNCTIONS

by

Mrs. Katherine Wallhan
Chief Federal/State Coordination and Technical Assistance Staff
National Center for Educational Statistics

Dr. Hansen made the distinction, partly teasing and partly serious that the National Center for Education is no longer part of the Office of Education. I hope that the implication is not that we're going in separate directions, and I hope that my presence here with a project sponsored by OE might indicate the contrary.

As many of you know, NCES was moved out of OE last August by law. This is what happened in the case of NCES. In the Senate version of the legislature, SB 1539, Senator Tower proposed that the problems of NCES could best be resolved by moving it out of OE and making it essentially a parallel organization with OE and NIE. The House Bill at that time had no administrative provision about the Center, so a small supplemental bill called HR 1391 was introduced which said that instead of quickly moving out the Center before the problems were known, it should be studied for a year before any decision was made.

As is customary, the bill went to a joint committee. When it came out, we didn't have either bill anymore. We had the usual compromise. NCES was indeed moved out of OE; but instead of becoming a co-equal organization, it was moved to the Office of the Assistant Secretary.

I note with interest that the Education Division has not yet put out an organization chart to reflect where NCES now sits in the structure, and I think there is some intentional reluctance at this point to make a decision where to put us. We keep getting new charts for OE and new charts for NIE. Nevertheless, we are sitting out there somehwere, trying to do our job.

In the bill that was passed NCES was given four major functions: to collect and collate information on the condition of education in the United States, to report and analyze such information for various purposes and audiences, to assist State and local agencies in improving and automating their physical and data collection systems, and to report on the status of international education. I don't find those four functions exactly parallel, but that's what they are.

Since the Center was moved out of OE, a new position has been established, that of the Administrator, who will head the Center. I think we're trying to keep the title clear because we have a Commissioner of OE, a Director of NIE, and an Administrator of the Center--and they are basically parallel positions.

A nation wide search for the Administrator started in December. At that time Dorothy Gilford, who had been Assistant Commissioner for the Center for Statistics, chose to retire, and she's gone to the National Academy of Sciences. Letters were sent out to many people, including chief state school officers and hosts of others, asking for nominations for the position of Administrator. I don't know what the total number of nominations was, but I do know that there were approximately fifty candidates who were screened by the panel in accordance with the method by which civil service appointments are made. The panel has recommended five names to the Assistant Secretary, Virginia Trotter, for decision.

In the meantime, with an acting Administrator, I think the Center has tried to do some new things and tried to respond to some of the new mandates we have. Of particular interest to this group is the new mandate to assist State and local agencies. As many of you know, over a period of years we have tried to offer assistance in data collection activities, but what we've done in the past has been basically tokenism. With the new mandate behind us, we do have somewhat better strength in this area. Unfortunately however, in the authorizing legislation no money was set aside for the Center to do anything about this assistance mandate. It is just another game in which we have been given the responsibility but no authorization to go with it.

Nevertheless, we're not giving up quite that easily. We are now in the process of working with the States--and in fact this will also include people at the higher education or secondary level--to try and develop some kind of a plan for the State and local agencies. The way the law is written offers little guidance as to what Congress had in mind. Therefore, we can imagine anything ranging from a minimal program which meets federal requirements to a very broad attempt to help every State and local institutional agency upgrade their systems. More often we're probably talking about something in between.

Before we return to Congress to ask for specific appropriations, we want to work with the State to try and develop better definitions of what kind of assistance is needed and to try and put some price tags on the various alternatives. We need to have a better consultation stance at the Center. We have not been able to release people, even in terms of travel money, to come out and work with the States for two or three weeks to implement the handbook or to revise, or to perform some services like that. On the other end of the scale we're considering establishing some kind of a grant program whereby we could advertise grant specifications so that States or agencies could then submit proposals again--not unlike the dissemination grants, perhaps, that NIE has now to avoid having to become all things to all people. I can't tell you the specifics of the program yet because we have not done the planning study with the States to see what kind of help they really feel they need.

Another area that we're trying to improve is reporting. We have recently hired a Manager of Information Acquisition, Utilization and Planning. His title is only slightly worse than mine. The NCES has for some time had the responsibility for putting together something called an Annual Data Plan. When we moved out it was not totally clear where that responsibility would go. However, the guidelines and regulations of Bill 93380 included a specific provision that NCES would serve as the Educational Division vehicle for assembling an annual data plan for OE, NCES, and NIE. In the past one of our problems has been that the data plan is essentially an amalgamation of forms put together by the various agencies. I would distinguish that format from a plan where people really look across the board at what is being done and then begin to think about what kind of surveys they are going to do in support of the plan. Hopefully, with the arrival of the Manager of Information and Acquisition and the revitalization of the Data Acquisition Task Force, we will be able to initiate a planning mode for data acquisition and depend less on putting together what the various components have done.

One of the things that we are working hard at, primarily I suppose because we've been criticized for it, but more importantly because it has been a long standing problem, is to get data out in a more timely fashion. If you can't get the

data out on time, people can't even begin to consider its usefulness. We have established a system called Ed. Stat. which some of you are familiar with. It is a network which can be accessed across the country. We're also doing some early release of data. We're testing these approaches right now to see just how much difference there is between the early release of opening fall enrollments in October or November and the release of the data by the time somebody can put it out in a form that a statistician could say is really acceptable.

When we get together, we usually talk about the problems that exist between the "Feds" and the State. It doesn't seem to me there's been much of a forum for the States to come together and exchange what they are doing. In my role in the assistance program, I need better information about the status and condition of State information systems--where you're going, what you're trying to do, and what some of your problems are.

A PIECE AT A TIME

by

Walter Talbot
State Superintendent of Public Instruction
Utah State Board of Education

Ten days ago I was asked to come here and speak. I told George Brown I would be happy to, if he would outline a few things that I should say, and then I would fill in the blanks. I expected that outline to be on my desk the next morning. Well, I arrived here last night, and asked Don Richards where the outline was that George Brown was supposed to provide me for my speech? He didn't know anything about it and suggested I wait until the meeting in the morning at 8 o'clock. At 8 o'clock this morning George handed an outline to me. It's a perfect example of accuracy, and timeliness, and adequacy of data. It was far too late for me to use it, and when I received it, I couldn't even read it.

The only way really to determine the adequacy of data is by determining if it meets the needs of the system. If it does not, it's inadequate. If it is in excess of your needs, it is an overburden. Any MIS must begin with determining the needs, and that cannot be done without the involvement of people at all levels--federal, State and local.

The only way that you can determine whether or not the data are accurate, is not just by filling in the data collection forms, but by formulating and using that data. Data becomes accurate when you use it for the purpose for which it was collected, and use it in such a way that it illuminates the truth of the data; and you do that only by deciding what the data ought to be and by defining it carefully.

Timeliness is also very important. What good does it do you to collect it today if you needed it yesterday? The two essential purposes of data collection are for reporting and for planning. These ought to be co-equal, but we spend so much time on deciding how to report the past we give very little emphasis to what the future ought to be. We need to balance the two out.

Generally there are three modes of operation in SEA's or LEA's. We can take the stance that we ought to build a system and pass it down so that it is mandated from the top and everybody conforms to it. Or we can take the opposite view and say that whoever has data collection needs should simply go about collecting it his or her own way. Or we can say that data will be collected through a coordinated effort in which those that have use for data determine the data that needs to be collected and how it is going to be used. The collection will be managed so that it forms a coordinated element and does not overburden those who have to find the data.

We should operate according to the last mode. We simply cannot tolerate everybody going in all directions, requiring the same kinds of information, but perhaps in a different format. Those who need data for program determination cannot tolerate an imposition from the top which might not provide the kinds of data they need. The only solution is for those people to get together and determine what the system needs. And the system has to be coordinated so that each gets out the things he or she needs.

Although we have done a considerable amount of development, we are still uncoordinated in terms of putting all the performances together. It has been one of the real struggles we've had. I would offer this much as advice: It's foolish to try to put together in one package in one period of time a complete EMIS. After 10 years at it, you won't have it. But if you can formulate the objectives and the goals that you expect to achieve and determine how the system will look when you get it put together, then you can build it a piece at a time. When you finish one part, it will have a relationship to the total that you envision. At least you will complete parts of it as you move along. I've been told, the only way to eat an elephant is a piece at a time. But, whatever it takes in trying to get at this business of managing information is worth the effort because it provides us with an increased ability to render the kinds of decisions that need to be rendered to improve the educational system.

MIS, IMS, AND EMIS--COOPERATIVE BUT NOT IDENTICAL SYSTEMS

by

George I. Brown
Systems Coordinator, Division of Data Processing

You've heard a great deal about data and information. Are they the same? The answer is obvious: They are not the same. Information is more than data. Some data is information, but not all data is. Now that is important to understand. Information is the assemblage of single elements of data which are meaningful and understandable and which convey the message for a concept.

In decision-making information is needed about what is, or about what was, or about what can be. Thus we need to understand how we can store data in order that information can be derived from it or that selected data can be translated into information.

Several years ago the State of Florida developed a student record that was monstrous in size. Fifteen thousand characters about each student were in that student data base. When they went through and tried to find out all that they would need to know about a student, obviously they found many things that they did not need at all. Florida's problem is not unique. One of our most difficult problems today is determining what we need to know. We must acquire the necessary data today to build the information we will require tomorrow. But data can't simply be collected over night.

The acronyms for the various systems--MIS, IMS, EMIS--look quite similar, but the systems are not. Some definitions are in order. Well, what is an MIS? Here's a very simple but a very understandable definition of what an MIS is. It is a system which provides information management for decision-making. That's an MIS. We've also heard about IMS's, and sometimes these two phrases, Information Management System (IMS) and Management Information System (MIS), are used interchangeably, but the systems are not interchangeable--please understand that. An MIS is a system which manages information, pure and simple. The two systems are not the same.

An EMIS or Educational Management Information System is an assemblage of components. For example, the components might consist of a facility management information component, a student management information component, or an instruction management information component. It is interesting to note that Management Information Systems and Information Management Systems correlate very closely and carefully. An Information Management System component may be comprised of some other kinds of components, a query component, and some report generation monitors, statistical and update components--all supported by a data base handler or a Data Base Management System. This is an integral part, I believe, of the ability to translate data into information. The Management Information Systems and the components of the Educational Management Information System will rely upon this data handler and upon these components in the Information Management System to get what is needed.

One final component of this system we should discuss is the data base itself. Now, you have seen different ways to store data. Obviously if you have it stored in filing cabinets, or on your desk, or in the next drawer, or the next

closet, it is difficult to get to. So, one of the great needs is to have an Information Management System that allows you to get at the data in an efficient and effective manner. Sometimes you need to know promptly what the information is that is requested. Superintendent Talbot called me one day to ask about the number of vocational teachers in the State who were teaching a particular subject. We were able to give him the information immediately because we have a generalized system that allows us to do just that. But, if the data is not there, there is no way that you can suddenly acquire it. You've got to start gathering it, and then build it into your data base. If you develop a system that is open-ended and flexible, you can build as you go; but you cannot start with the whole world.

ASSESSING INFORMATION SERVICES IN THE SEA

by

Don Richards
State Department of Education, Utah

In the past, I suppose, as administrators we focused on the moment when the decision was to be made rather than on the process of making the decision. Now, however, the chances are our decisions will be better if we become involved in the process of making a decision and in the design of the system to facilitate our decision-making.

In the final analysis, the adequacy of the system is going to depend upon the skill and the attitude of the decision maker. The system will be adapted to his organization, and he will have to view his area as a part of a whole rather than a whole itself. He will have to realize that in order to improve information processing on his part, perhaps he is going to have to change his behavior.

Four questions you might use for discussion in your groups in this area are these. Does the attitude and skill of your State superintendent and his associates include the desire to manage by using improved information services? Has your State superintendent or associate superintendents expressed some dissatisfaction with the information services within your SEA or expressed the desire to become better acquainted with them? Has your State board or your top management taken a position for or formulated a philosophy setting forth quidelines related to information services? And finally, has the top leadership in your State agency taken or is it willing to take the leadership in the design, development, and implementation of a Management Information System?

These questions might also help guide your discussion relative to the present status of information services in your agency. Has your SEA completed a needs assessment relative to its presently existing information services? If not, that might be an appropriate place to begin. Does your SEA have an agreed upon and sensible policy or position relative to information services? It is likely you'll find that such a policy does not exist or exists only in piecemeal fashion. Is relevant information available in your SEA in a form and time frame suitable for use and decision making? Someone said a pessimist is an optimist who is in possession of the facts or information. Does presently available information in your agency suffer any way from lack of quality? For example, is it irrelevant, unreliable, redundant, or invalid? Is access to and control of the information in your agency haphazard or uncoordinated? Is the data processing support to your Management Information System either non-existent or poorly defined or perhaps not clearly understood by decision makers? Is available information in your SEA used, or perhaps used improperly, to make decisions? And finally, does your agency have a mechanism for determining and prioritizing your system developments?

EMIS DEVELOPMENT--PITFALLS AND ADMONITIONS

by

Richard Maxfield
State Department of Education, Utah

Many information systems, particularly in education, have been abandoned prior to being used. With that abandonment usually goes part of the staff, particularly the data processing staff. Sometimes technical failures have been at fault, sometimes inabilities to produce have existed, but by far the major reason for the forfeiture of systems prior to full utilization is the lack of involvement of management.

Commitment from Management Essential

If the educational manager is not involved, he forces the designer of the system to play blind man's bluff. The direction must come from the top where the best direction exists. Management best understands the overall goals of the agency and the emerging goals. A Management Information System covers all facets of the agency because all personnel use information in the various functions they perform. These must be closely coordinated but cannot be unless management provides for that coordination.

A Management Information System is an important resource which can be used to make the State agency more productive. It is, therefore, important that management help design the system and not assume its role is complete once approval has been given to establish one. The design necessitates conceptual design components which must be determined by management. There is no end to the number of components and the number of characteristics that can be built into the design of a Management Information System. In many educational agencies the staff, in general, is not familiar with or apprehensive about information systems, particularly as they might relate to data processing, and will seldom, by themselves, build in the proper objectives. Therefore, top management must see that such coordination exists.

Last year I visited a large western State. The financial officer for the agency had developed some elaborate information which would be very useful to the agency in general. I asked him if that information were going to be made available for utilization through the Management Information System--they had a very excellent one where you could pull out information from all data bases and massage and manipulate it in very flexible ways for the use of management. But he was not putting it into the system because he wanted to control the information himself. It is just that kind of attitude which can undermine and ruin a system.

A wide variety of people must be involved in the design of any information system, not only top management and the information designer. The researchers and the statisticians have to be involved as well as all of the potential users, which usually include all the departments or top agencies. This need for coordination creates some teamwork problems that do not exist elsewhere and extends beyond the coordination required in a general task project or project task committee assignments.

Many times the information systems people feel they have management commitments because they secure a formal approval, but that is not the kind of commitment necessary. The best way I can describe this briefly is to quote someone who said, "The differences in enthusiasm is the difference between a puddle and a geyser." Unless top management bubbles over with the system, passive approval to move ahead is not adequate. I've seen many systems abandoned even though they have had the formal approval of management because the management was really not that excited, really not convinced that the system was needed. It wasn't prepared to properly utilize it. It wasn't properly involved, or would not get involved in the design and development of the system.

Difficulties in Developing a System

Even though the designers look to management to give the specifications of the system, management often does not know what it wants. At first management identifies current needs, but a few months later or a year later or once management has gained further knowledge by experience or understanding of such systems, they say, "We would have liked this, or we would have liked that. Can we really do that?"

It becomes very difficult to have a satisfactory system without adequate thinking and planning and without adequate needs analysis. Oftentimes the end product is a beautiful system that solves the wrong problems or that doesn't have the right data. For example, you might have to be dealing with fine bases to pull out information that you need. If you don't have the support soft-word access to those five data bases and can only access two at a time, you may have some problems.

A conceptual design should be a little broader and larger than the intended use. That gives you some growing room conceptually. In Utah the grant's management segment of the information system that we will be developing will deal with just two areas, but it will deal with two, and it will be geared to handle some specific problems to help manage grants in the agency. It is important to decide what the components are going to look like, how they are going to be put together, and in what order. Some of that has to be done in advance; but the common characteristics among other systems that may be desirable should also be considered so that those can be built in the initial support soft. Then you won't have to throw the system out and start over when you're ready to add another major component.

Three Approaches for MIS

Many approaches can be used in developing a Management Information System. I chose to discuss three that are broadly representative. The first approach I call a detailed pre-design approach. I also call it the Boxtonian Approach because in this approach all minute details of the system have to be designed ahead of time. By the time you look at all of the details and all of the relationships that can possibly exist, the system is ready to be put in the grave. Superintendent Talbot mentioned the wisdom of getting a broad conceptual picture and then beginning with some component, knowing that it would fit in later on. But more commonly, I've seen information systems designed according to the Boxtonian Approach, and once they accomplish their purpose, they are in a box canyon with no route for retreat.

The second broad approach is the mutation or scrambled egg approach in which information is collected as a by-product of other services--usually clerical, routine services such as grade or attendance reporting in the schools. It might also be the budget or financial record keeping in the agency. Some information is available and somebody says, "Wouldn't it be nice if we now tapped this information for the use of the Management Information System?" Obviously, this is information that management might be using, but the system is not a Management Information System unless it can combine information in a more useful, flexible, adaptive way and can make the information far more usable than as it might exist in a data bank.

The best approach is the evolvement approach. Very few systems emerge--they evolve. I've never seen a successful one yet that just emerged and existed all of a sudden where it didn't before. Fortunately new capabilities are now available and the costs have been reduced for such software so that by using hardware and software techniques, and new design techniques, you can design a system that can emerge, that the first component can be a viable, integral part of the total system as it completes itself without major revamping. If major revamping is needed they have the flexibility of allowing it, without going back and redoing the other parts of the system as they have been developed.

Unfortunately the evolvement approval requires adequate hardware and software, and these are difficult for the small agency to acquire. Perhaps you will have to work cooperatively with someone else's computer, or in some cases transfer part of your data base to another computer. California is doing that in part of their information system. They have readily low-cost access availability to technical hardware and software from Stanford University. They put their data base on that support software for part of their information system.

Among my final admonitions to you in establishing a Management Information System are these: Make sure it's clear in your mind exactly what you're getting and how it's going to be used. Don't be sold on a lot of extras without understanding exactly what they are, what they're going to cost, and how usable they are going to be to you. As a designer, you must look to yourself. Has the total scope of your system been defined? Are you playing the right role? Do you have the right relationships? Are others playing their right role? Can you afford to go ahead without a proper foundation? As a manager of the information system, do you have the right liaison between technical and top management? Do they have the proper access to each other? Do you give the system more attention than you give the production line activities of the agency? The last piece of advice in choosing an approach is just keep your fingers crossed. After you've done all else, you will need a little luck to have a successful Educational Management Information System--even after you do all of these other things.

THE CONCEPT OF SYSTEM EVALUATION

by

Dr. Robert G. Steffensen
Coordinator of Management Support, Utah

The concept of system evaluation is really quite an interesting one. In general, it consists of not only the kinds of things we've mentioned such as planning, ordering, coordinating, and decision-making, but it also consists of the function of the system. An MIS doesn't necessarily reside in a computer. An MIS might consist just of yourself, if you're a management person, and--by and large--this is just what the situation is. You control the inputs to the decision making process, and your decisions are the output. That's the system--the inputs, the processing, the decision-making, and the decisions that come out. That really is the kernel and the crux of the concept of system evaluation.

Now, I'm a systems analyst by training, and I've been receiving assignments that have sent me into management to help them document their existing MIS's. Because their MIS already exists, it was very helpful to go in and show them what they had because we found out they didn't really know what they had. To start with, we applied the concepts and techniques of system evaluation to document the presently existing MIS--whatever that might be. The results have been astonishing. One of our deputy superintendents, after taking a look at the documentation, said that this was the first time he'd ever been able to know what happened to information after it had left his office. The same comment was also made by some of the division administrators. They had never seen the system in its total state, documented.

Evaluation must begin with defining the existing Management Information System and documenting it. In addition to the documentation, you should also try to determine how much the system is costing you. In business and industry, management is concerned with maximizing returns and minimizing losses. When was the last time we thought about that in education? We have an MIS; how much is it costing us? Is it a cost effective system?

After you have defined the objectives and the goals of your present MIS, performed a system's study on your present system and documented it, and determined the cost of that system; then, you can begin to take a look at what's wrong. At this point, of course, you want someone who can do some design work. He's going to do about the same thing that was done in assessing the first or the existing MIS. He'll sit down and take the stated objectives for the performance requirements, or the system's specification or whatever, and start generating some proposals to resolve the needs or to eliminate the discrepancies.

Now you will have two sets of data. You will have, on the one hand, the data of the existing MIS, and on the other hand, the proposal. Then, you can begin to evaluate the differences in terms that will enable you to make intelligent decisions. Maybe the one you have is the one you want to keep. Maybe the secretary is doing a better job for the money for your needs and specifications than a sophisticated data processing system. That is an important consideration.

In order to make a determination about an existing system and a proposed system, make a cost comparison of the existing system with the alternative system or the proposed system. Then you can have the total cost of the proposed system

and the differences between the two, indicating the trade-offs, and so on, as far as cost is concerned. You will consider system design, modifications, preparation for conversion, and implementation costs which include such items as system analysis programing, key punching computers, form supplies, etc.

Some additional information is essential in making a decision about the two proposals, the existing and the proposed. One consideration is the annual cost--what is this going to cost me from year to year? These costs are for computers, supplies, operating personnel, maintenance overhead, and capital outlay.

In the final analysis, what is the cash flow in regard to your agency after five years of operation? Consider also the earnings, or the payback to you for the effort that you have gone through in the development of the proposal. Theoretically, you could have something that is saleable to someone else and it may therefore bring some returns.

Now, you have information to make a decision over the present system and proposed system for a period of time. Essentially, what we have been talking about here is kind of an information system or a Management Information System for deciding on management information systems. All MIS's are IMS's, but not all MIS's are MIS's.

ESTABLISHING AN INFORMATION SYSTEM IN A STATE DEPARTMENT OF EDUCATION

by

Dr. James Mitchell
Associate Superintendent, Planning and Management Information Branch
Department of Public Instruction, Iowa

While driving across South Dakota, Wyoming and Montana, I had a lot of time to think--to put some of my ideas in perspective. Let me share some of these with you.

Knowledge and Wisdom

Thomas Jefferson expressed the alternative to not educating all of the people when he stated, "If a nation expects to be ignorant and free in a state of civilization, it expects what never was or ever will be." This country has been built on a system of free, tax-supported, compulsary education. Actually, education and democracy and government have been almost synonymous. James Madison, the fourth President, anticipated this conference when he stated that "A popular government without information or a means of applying it is but a prologue to a farce or a tragedy and perhaps both. Knowledge will forever govern ignorance and people who mean to be their own governor must arm themselves with the power that knowledge gives." These statements of two former Presidents provide us with a suitable point of reference for the conduct of this RIPP Conference on the operation of information systems.

To make wise decisions on all levels of education, whether it be local, intermediate, State or federal, more data are needed about students, personnel, property, finances, education programs, and community resources. But educators frequently do not have the facts, the trends, the projections, or the statistics to make proper decisions, either in the administration of a school, the operation of a curriculum, or in otherwise meeting the needs of students or the population in general. Much of the information that we need is being collected, reported, recorded at all levels; but it is buried in files and not readily available in a useful and a manageable form to the right people at the right time. Although educators are making significant progress in the development of information systems, there is a need for coordination at all levels to insure an uninterrupted flow of information, both upward and downward, in the educational hierarchy and to avoid unnecessary and expensive duplication of efforts and equipment.

Education, to a great extent, is an information processing system. Learners must process information and through data analysis and retrieval, logically deduce conclusions which can be applied to decision-making situations in the real world environment. Knowledge and accurate information are a powerful team in gaining wisdom. It is said best in the Bible: "Wisdom is the principal thing and therefore get wisdom, and with all thy getting, get understanding." (Proverbs IV, 7.)

The Need for a Coordinated Network of Systems

A lack of leadership is the chief problem in developing information systems. State departments of education have generally ignored the implications of computers. Until recently, the U. S. Office of Education had not become involved in the area, or if they had, it was a token, uncoordinated involvement. Both State departments and the USOE need information from local schools, but they find that the information is not available in a readily usable form. Local schools have devised their own coding schemes, their own methods of extracting information and have their own ideas about what constitutes important data. As a result, State departments and the federal agency have had to wade through inefficient, complicated processes of translating one coding scheme into another in order to secure meaningful and comprehensive data. Only recently have these agencies worked toward a common standard of information definitions and codes for the use of all States and all local school systems.

The Division of Education Handbook series does now provide common definitions of standard terminology for all the areas of data collection, but it is really tokenism because nothing has been done to get it implemented. We will continue to have problems in data collection and in transferring one coding scheme to another until we secure widespread use of our standard definition and terminology.

The role of SDE's has changed over the years from an inspectorial and statistical gathering one to a new, perspective one which places the agency in a keystone position in local, State, and federal relationships. This emerging position holds great promise for effective statewide improvements in education, and this is especially true in the area of information systems.

Integration of the Agencies and the Information System

An integrated data base, or an integrated information system, or a management information system requires an integrated agency. It is tremendously difficult to get an integrated information system or an integrated data base if the information system does what the agency doesn't do. If you integrate the agency, then integrating the information system becomes fairly easy. When you get one colleague sitting at one desk to talk to another sitting at the other, you have initiated an integrated data base, but if these people won't talk to one another, they won't share the same data. I hope I made that clear, because I think that is important. Our problem is that we try to do things with the information that we don't do with the agency. It's impossible.

A fundamental concept of information systems is that data at the local level is being collected as a by-product of the local school districts, it is then summarized at the State level and again at the federal level. We often lead ourselves down the primrose path in data collection and information systems with the idea that we need certain data not needed at the local level. That is what we say at the State level sometimes, and the people at the federal level say they need data that the States do not need, but I don't think that is true. Local school districts have the responsibility directly to students, and I think data--if it is going to be accurate and valid--must be collected as a by-product of that operation and then summarized for other people's use. If the data is not used there at the local level, then it is not worth collecting. If you only want "guesstimates," then you might as well do like some

doctoral students writing dissertation do--sort of "poke" in the data. In Iowa, poking in the data means that on a hot summer day, you sit in the shade, have a coke, and fill in your data.

Establishing a data base means setting up a plan for what you collect and deciding how you are going to use it and how you are going to process it. You develop some kind of generalized software to store your data in a format that allows you to extract any one or more combinations of data items and put them together.

The fundamental issue in integrating the agency is establishing an integrated data bank. You can't design an information system one piece at a time and ever come up with anything. First you design the overall data base or information system, and then you develop the system and implement it one piece at a time. The overall design is imperative because if you implement a financial data base without any thought to the pupil data base, the chances of them working together when you want to use them together are nil.

Another fundamental issue is to build a base that provides services to local school districts. School districts--even though they vary in size, vary in programs, and vary in the amount of resources they have to allocate their program--still have the same basic problem. They still have to schedule kids and teachers in some kind of facility whether it be open, or whether it be a classroom, or whatever. If we could provide those services, and get the data as a by-product for paying teachers and hiring teachers, certifying teachers, and scheduling kids, teaching kids and giving grades to kids, whether they be "pass," "fail," or A, B, C.--if we could do that, the data would be meaningful.

Your responsibility for evaluation, where does it belong? With the federal government? With NIE? I think not. Evaluation belongs to the local schools. Can you name any teachers who would admit they are not interested in their kids or what they learn from the class? What we need to do is assist teachers in doing their jobs, but it is their job to do it, and they can do it if we let them. Collecting data at the State level for an evaluation of programs at the local is just next to impossible. You can only summarize at the State level to see what happened in school district A and school district B, if they are in fact evaluating.

Phases in Establishing Information Systems

There are phases that we go through in establishing information systems. The first phase we have discussed. We need standard data definitions, we need standard collection procedures, we need data storage, data retrieval, hardware, software, personnel--all blended together in a frame. Second, we need to organize it into meaningful documents. We need to make it into products for people. What are the requirements? To be able to give them the reports to fill whatever levels of management we are talking about. The third phase is to give the system a long range perspective, to identify the needs and goals and long range planning we need to design our objectives into that system. We need to put in alternative solutions, to be able to pick from alternative solutions, to retrieve former written documents and evaluations. If we do all these things, I would submit in the first phase we would really have an integrated data base, and in the second phase we would have what we might call a management information system, (MIS), and in the third phase, we would have the strange animal that people call PPBPS, if you will.

It is important for any State department embarking on an information system at whatever level to at least be cognizant of some of the problems. Policy statements are necessary, as well as definitions of need. Coordination of data input is imperative. Everybody scattered throughout the State agency collects data, but sometimes I think the objective is to collect the data, and not do anything with it when you get it, just collect it. It is rather like the Iowa farmer who was given information to farm better, and he said that he already knew how to farm better than he was farming. We already know more about information systems than we are putting into practice.

If we had additional resources, perhaps we could do our job a lot better than we are doing it. We complain that the systems are designed by technicians rather than users, but the only reason that they are designed by the technicians rather than the educators is that educators will not get involved until it is too late, and then they step on the bucket and throw everything down. If you do not want the data processors telling you what to do, you better get off your duff and tell yourself what to do; or somebody is going to have to do it for you. You have to roll up your sleeves, get around a table, and agree to cooperate.

Every group that gets together says that one thing they are not going to do is reinvent the wheel. How many times have you heard that one? What's the first thing that they start doing? Reinventing the wheel. It is hard to say that what Texas has got is better than what we have, but why not take what Texas has or what Minnesota has and get it operational, and then make it better? We just don't do those kinds of things.

Dependent Phases in Building a Data Base

There are four dependent phases critical to building the data base and retrieving from it in information systems: data collection, common base, plan for processing, and equipment. The major source of errors in the data base would be right from the source documents of the data collection. If they are poorly designed, if the instructions are poorly written, if there are no standard definitions, you are not going to collect data. If it is open to various interpretations, if one respondent and one local school is going to think you want one thing and the other respondent is going to think you want another, you are not going to have data. It has got to be crystal clear. We have proved over and over again that Murphy's Law operates in the area of information systems. Murphy's Law states that whatever can go wrong will. Mitchell has added a corollary--it will be the least expected first.

We also have payback systems for data collection. If you want garbage, it is pretty cheap. If you want data, it costs a little bit more. If you want information, it costs more. If you want plain information, it costs a little more; but if you want it to give you what you want to hear, then that is real expensive. You may have to develop a little charge-back system.

Building a data base does involve the user in defining the data base. It has to be flexible enough to be expanded from year to year. It has to go through various processes to identify what data items go in and what come out because a data base can never collect everything that was collected in the past.

A plan for processing data must also be devised. Don't think you can wait until you have data and then decide how you are going to process it. Again, the plan should be flexible. It should be a user-oriented system in which you can give people what they want in the right format. It should have a history file, a transaction file, updates, and detailed summaries that people may want.

I think people are beginning to realize that equipment is not nearly as important as we thought it was years ago, but certainly there needs to be in the overall plan a summary of the equipment which satisfies the plan and the design. It needs to be a kind which can be updated and can use common languages such as COBOL or whatever you use without being changed completely every time you want to change a piece of equipment.

Policy Statements

In data collection it is very important to consider the area of policy development. These policies should include the purpose of data, the management of data, and the use of data. A policy statement concerning the purpose of data should include why data is dated, who needs it, how it will be reported, and when it will be reported. I am now talking about the agency level, not necessarily the detailed program level.

The management of data should be a forms management unit which should avoid data duplication and should contain data items collected by staff to assist them in their data collection procedures, to ascertain reasons for data collections, and to render all data collection uses in standard terminology. A policy statement concerning the use of data is especially important with some of the new laws of confidentiality of data. If we don't know how we are going to use data, who we are going to release it to, or how we are going to release it, then we have problems. Without policy, it is difficult to keep your objectives clearly in mind.

Forms Management: Organization and Justification

In forms management for overall data collection, there are two important concepts to consider: organization and justification of data. The forms unit itself needs to have these built in initially, as well as a procedure for review and evaluation. Organization refers to the design of the information system. Data collection must be organized at its source, for example the source that designed the data collection instruments. If you don't organize the source of these collections or if you fragment them across your State educational agencies, it is almost impossible to reorganize them later on.

I am here talking about not only organization within the State agency but also organization outside of the State agencies. The external organization applies to the plan used to work with local school districts. I do not advocate working widely in the agency having different people collecting data from different points of view. The system needs to be centralized and radiate to local school districts and also to regional centers or intermediate units. Regional centers do provide services to the local school districts, and it makes sense to involve them in data collection and reporting procedures. If the data are available easily and directly from these centers in machine readable form, perhaps we don't even need to transmit the same data to State agencies as we have done in the past.

Justification is the other important thing that we have to do in data collection. There are many ways to justify data collection. A common one that we use with the most authority is that the state legislature and the federal government want it--that justification seems to pacify everybody. I'm not sure that is the justification we really need if we are going to have an integrated data base, be able to retrieve from it, and satisfy most of our users.

Some States have organized their data collection into the fall collection documents, the winter collection documents, and the summer collection documents. Recently, the trend has been for State departments to reduce the number of forms even though the depth and breadth of the collection documents have expanded.

In justifying the data collection efforts, you must consider funding. You also need to know what kind of expectations the user has for the data. If he has no expectations, then--at least at that point--the justification is suspect.

We also talk about justification of data collection in broad general terms or on the basis of general principles. We can justify on the basis of information systems, and unfortunately we sometimes justify on whether or not we like the person who is requesting data. Our justification often depends too much upon relationships between people. For instance, the young girls beginning in our department seem to be able to justify their data easier than some of the old heads, and I just wonder if my forms unit personnel are more impressed with the young, good-looking girls than the justification, not that I have anything against beauty. I believe justification of data must be based on specific written criteria.

The processing, analysis, and the reporting of data all need a time schedule before you start. You should not approve major data collection projects without these kinds of justification. What kind of statistics are being applied to the data? To whom is the data going to be presented? What are the target populations for dissemination? These are fundamentals for justifying data collection. Too many times we say we're going to produce a report, and we do. We bring the data in and process it, we put it in a book, and it sits over on a shelf. That is not justification for data.

Setting up a Forms Unit

Justification of data and the forms unit go hand in hand. The forms unit is the key ingredient in the entire process of data collection. The unit must work in the State department where it is viewed as a positive assistance instead of a negative constraint. That is very difficult to achieve especially during the first year of operation because their roles of reviewing all forms and approving all data collection will be readily accepted in the department. If you don't have a forms unit and intend to establish one, you are going to have to be patient. You need people in there who can cooperate and be of service, but you also need fair and firm people. You need people that can say no. If your forms unit can't say no, then you don't really have a forms management procedure.

Two factors will determine, in the final analysis, whether or not the forms unit is successful: the commitment of the top level administration and the allocation of sufficient resources. Forms units should be established by policy. If not, then the foundation is going to be more sand than concrete.

Certainly, the personnel should have some skill in designing forms. They should have the ability to write instructions clearly. They should have knowledge of the existing forms and data items within the department. In other words, they are the central source of what is available and what is being collected.

Developing a forms unit requires a multi-year implementation stage in most State departments because this is one of the operations for which we don't have sufficient resources, and it is one that lags far behind the rest of our operations. It seems easier to buy a computer than it is to organize the forms unit.

Allowing for Exceptions

Forms management procedures must also allow for exceptions. Deal with exceptions before you have them because no matter what your plan is or what your main cycle of collections will be, some needed forms will not be planned. Sometimes the boss says, "I have to have this," or the legislature says, "We have to have this." The only way to do it is to do it. Get the form out, bring it back, process the data items, and produce the report. Don't get frustrated by exceptions because I think they will verify that your process does work. Just make sure an exception really is one because if you have a procedure that can bypass all the standard agreed-upon procedures, somebody will want to use the bypass. You have to have a hard-nosed approach and make sure that exceptions are truly exceptions. When they come from the boss, they are always exceptions.

Review and Evaluation

Another necessary process in forms management procedure is what I refer to as the "human evaluation." The task is important, but it is probably the one that is least done. It is important to follow up the data collection cycle and the processing to see that the reports were done and that they were done on schedule, that the report shells were done, that the statistical analyses and the reports were disseminated. Without review and evaluation, we really don't have anything. The way to improve our data base each year is by following up with the review and evaluation.

System Products--Annual Data Plan and Data Item Directory

After a forms management procedure is established there are a couple of products down the line that you can look forward to. A forms management procedure will produce these things after a few years of implementation. One is an annual data plan and one is a data item dictionary. If your forms procedure has been in operation for several years and these products are not available then you need to determine why they aren't. An annual data plan identifies what forms are being collected, when they are being collected, and who they are being collected from. In other words, it controls the data collection process. It provides a good way to communicate with the department, and it is a good way to communicate with local school districts. By looking at the annual data plan, the local districts will know what the State department is going to collect each year, how they are going to use it, and when the districts will get it back. The plan will show a schedule, it will demonstrate control, and it will tend to eliminate all renegade forms.

The data item dictionary is a management tool used basically by the State educational agency. It prints out data items in the base by name, by description, by file name or code format in the file, by the kind of data or type of data--whether it is pupil data, whether it is finance data--and maybe by a key word to help index it in the file.

A data item dictionary can be a real benefit to the State department because it provides a way to sort the data base in any one of these ways. If you want to look at what data are available in your department by student data, you can sort it out by that kind of data and have it in an Alpha listing. If you want to look at what is on Form SAR 10, then you can print it out on that; and it can show you all the data items on that form. The dictionary offers better use of the data base and helps to avoid duplication and overlap. It is something that data users take a great deal of pride in because it is theirs. When you get people in your agency to take pride in their data base, you have taken a giant step forward.

Recommendations

My first recommendation is to get started. If you do not have a forms management or a data collection procedure, start one. Do it now, no matter how small your initial effort is.

Then I recommend you formulate policy on data collection for information systems. State board policy or rule or regulation or a guideline set by the central administration or by program managers--just get it written down. If you can't go to the State board for a policy statement or to the legislature for a law, write down a rule and regulation. This procedure at least shows intent and shows direction.

Another recommendation is to assign somebody the forms unit. It doesn't make much difference at first if it is only one person who has 100 percent of his time taken up. No matter how small a percent of time can be assigned to a forms unit, assign it. Assign somebody the responsibility of beginning to look at what is being collected and how it is being used.

When this person has been assigned, the next step is to develop some operational procedures. Develop a flow sequence to determine how you are going to communicate with people and who you are going to involve. Don't be afraid to change as you go along because you probably are not going to be right the first time. Don't worry in the beginning about the authority that you have or the lack of authority. Even if the forms unit has to start permissive, if there is one person who is willing to let the form's manager work with him or her, that is enough for a start.

The next step is to establish a forms log. Every division in your department must become aware of what is being collected. Not only by themselves--that is the first step. The next step is by the other divisions in the department. You would be surprised how many don't know what they are collecting. Much of it is being collected because it has always been collected.

After the forms are well identified, start on the data items. What is in the forms? Make sure everyone is aware of them and of how they are being used Establish listings of standard terminology and definitions. Most of us have some kind of State handbook series. The Division of Education Handbook series can also be implemented.

Begin to assimilate uses of forms and data items. Check for gaps and duplication and non-utilization. Of course you have to know the forms and the data before you can do that. Automate that process when possible. Start doing it manually because you can't start with a fully automated system, even on forms and data items. When you have the capability, do it automated and make sure that all new forms as well as old forms that are being automated pass through the forms unit. That is when you begin to get an annual data plan and a data item dictionary.

You cannot begin everything at once, but you can start on the major items. In other words, finance is usually the most important statistic gathered in State departments. Start where the priorities are. Start on the automated processes, and let the manual ones sort of creep in. The important thing is to get started.

UP FROM THE BASEMENT:
THE PERSPECTIVE OF THE DATA PROCESSER

by

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Perhaps the easiest way to talk about the environment of executive use of the computer resource is to look at what has been happening over the years in the evolution of the use of the computer in administration and education. Back in the early 1960's when computers were widely introduced for administrative application, the computer was used to automate clerical and reporting kinds of functions. We used them to process enrollment reports, produce census reports, do transactional-oriented functional processes to turn out checks, or lists, or reports. Through automated clerical functions we displaced, perhaps, or avoided hiring additional clerks, and we saved on paper and forms--those kinds of things.

In the early 1970's and up to the current period, what the consultants say we have been trying to build are operational control systems or information systems. In these types of systems we talk about broad informational requirements, budget requirements, or course curriculum materials requirements. We have built systems around chief executive officers for certain areas such as a new encumbrance system for the budget officer; a new statistics system for the reporting and student offices, and so forth. Typically these things are called MIS or IS. Management Information Systems or Information Systems.

The consultants say that at the end of the decade the real role of the computer is going to be in serving the policy and planning functions of the agencies and institutions. In that way we will move out of just operational controls with pre-designed reports prepared for a specific control executive into serving aids such as analyses and projections, facility planning studies, enrollment models, and things of that sort. As I travel around the country today, I find more and more applications growth in the policy and planning area; as well as a continued development of operations systems.

We have seen a real movement in the role of the computer. It's not just displacement of cost that people talk to me about now but the concern that "if we had this kind of information and could go into that joint finance committee here and prove that we have the workload to justify that $250,000 increase, then we would have new revenue for the agency." Or, "We can protect current budget levels, if we can prove utilization." In private colleges 50 more students means $100,000 more revenue, if they're in recruit mode. Obviously, these kinds of considerations indicate executives have given a new value to information which extends beyond the traditional ways we in data processing used to look at those systems.

We have been building operational systems--those operational control systems. In your environment those systems have fallen typically into the student area and the financial and funding and aid area, personnel systems and reporting and tracking, teacher certification, federal programs, administration of the titles, materials and curriculum studies and reporting. In some cases, these

applications for a State agency are internal relative to administration of the agency and its programs; and some things are external, either services provided the districts or district reporting and monitoring kinds of systems.

There is yet another process, however, outside of those operational processes, and that's the management process. Is there a management process in education today? Yes, I think there really is. Those of you that work at the State level certainly will acknowledge that, based on the external pressures and funding environments that you are in. In colleges today there is growing acceptance of management processes, although the threat to academic freedom causes considerable concern.

What does management do at the State level, at the president level, at the superintendent level, at the district level? Basically, work with subordinates and clients. What management does falls into several categories. One of these is goal development. Many of us are deeply involved in setting goals for education and educational agencies, in setting specific objectives because of State or federal requirements or because of our own need to manage in a tight fiscal environment. We must devise a strategic plan which states how we will, in a broad course of action, achieve those goals. And in support of those strategic objectives we prepare a course of action for our vice presidents, our associate superintendents, and so forth, to achieve those strategic objectives. Those planning processes all require data.

Another management category is budgeting and allocation of resources. How do we allocate the dollars that we have across programs? How do we negotiate income with State legislature committees? How do we negotiate salaries and wages with unions or associations? One of the broadest management applications in business today is the use of the computer in negotiations and modeling for collective bargaining. We've seen managers actually take terminals into labor negotiations sessions and use the terminal to evaluate models based on the impact of the fringe and salary programs that are presented. That's happening all over.

Yet another category is measurement and assessment. More and more emphasis is being placed on accountability, on evaluative criteria, on progress--quality measurements, activity measurements. These all require processing of data too.

As we look perhaps at the environment of the executive in education today, we find it abounding with contentious public issues: issues of assessment, of compliance with federal and State requirements, of teacher and staff unrest, of affirmative action compliance, of demands for special education, of shifting and declining enrollments. We are well aware of the pressures that some of you are under and that others of you will soon be experiencing: security and privacy of information, parental and student rights, issues of productivity and inflation. All these issues--changing programs, changing emphasis, changing students, changing State and federal requirements, reduced financial resource, and adapting to change in that environment--all these pressures come on the chief State officer.

The role of management in education today is a very political one. Because of all the people in your constituency that your chief officer has to deal with--the legislature, the governor, the community, Washington, students, staff, civil service, teachers--because of these various and often abrasive relationships, chief school officers have necessarily become consumers of information, consumers of data, and users of data. This environment has a direct bearing on those of us who work with data resources and on those that work with data processing.

How do executives use data? I have looked and looked at proceedings from conferences like this and read and read to try to find out, but out of the blue one day in the mail a report came to me from a study done by Harvard University on the nature of the use of quantitative data by educational administrators. In fact, that's frequently how I find I get my best research done. Somebody just sent me a copy, and I've been using that--plus my own observations and some other things--to find out what it is about data that concerns executives.

Most importantly they don't want to be overwhelmed by volumes of detailed reports. Executives do not use detailed operational data. They use composite data--that is, comparative data from financial files or student files or programs files and personnel files--and updated periodicals published monthly or quarterly or annually. They use summary data from individual files, they use budget summaries that are updated weekly or monthly, and they use summary composite data, which is data from multiple files summarized periodically on a weekly or quarterly basis for comparative and trend analyses.

One of the overwhelming objections chief State officers have about data processing is that it doesn't provide them with management summaries; it gives them detailed reports. They don't want to--and don't know how to--use these. The most frequent criticism we get is that of providing too much detail and too much paper and not enough summarization and comparative kind of data. In fact, one administrator told me that most administrators can only look at data in a two dimensional view. To try to explain data hierarchies and data base and all those kinds of things and expect them to know detail is really unfair. What you have to do is find the right way to summarize.

Administrators use data in three ways: in inquiry mode, which is a question-asking mode; a report mode, which is periodical composites of data; and an exercise mode, which is an elementary model to change data to see what happens--the "what if" kind of activity. That's the way they use information.

Administrators have six concerns about data, as I summarize them. First, is access. "Gee, I think we have that data around here somewhere." "When I talked to data processing, they said they had to write about three programs and do 15 sorts to get it for me." "Why can't I have it?" Second is timeliness. "Why do we close the student files at a different time than we close the finance files?" "The regents are meeting next week. Why can't I have that?"

Third is redundancy--duplicate records and multiple forms of records. Duplication of data really bothers people, particularly when they are doing measurement and evaluation. I talked to one president who said, "Gee, I would really like to know how many students I have." I said, "You have a big computer." "Yes, but everytime I ask the Bursar I get one answer, and everytime I ask the Registrar's office, I get another answer, and everytime I ask the Admissions office, I get another answer. They all have separate files, and they all have separate accounts. I don't know how many students I have." Then, I went somewhere and related that example, deleting the name of the institution, the president walked up right in the middle of the conference room and said, "Hell, young man, I'd just like to know how many faculty I have." Redundant data certainly does seem to bother people at the executive level.

The fourth concern is accuracy--how do I know these numbers are right? Do they correlate with what the State and the federal level have? The fifth is centralization. I've got multiple, autonomous districts, or 'I've got multiple, autonomous campuses. How do I pull that information together into some unified measurement? Those people want to run their own show, they want to run their own programs,

they want to use their own set of accounts, they want to use their own program structures, they want to use their own calendars. If they do that, how do I get some data together that I can analyze to make sense? And the sixth concern is security. Even though I keep student data--and I am required to keep student data for measurement and for planning and for budgeting and all those other kinds of reporting--I am now held accountable for protecting the privacy of that information. And to protect the privacy of information from accidental or intentional disclosure, I have to provide data security. I also have to protect it from accidental or intentional modification or destruction. So the Privacy Act has great impact on many concerns.

Frequently I'm called upon to talk about all the things we build in our hardware for security--for terminal security, program security, and data base security. These are very impressive; but, when I finish my presentation and I ask people to show me their Policy and Procedures Manual on security, i.e., who owns data in your organization, who's responsible for the disclosure of data, there is always a long pause. As a data processer, I have become firmly convinced that the security problem is not so much a technical problem as the management framework built around it. I really think educators need to make a greater effort in a policy and planning mode. The University of Texas has a large task force doing policy planning for security and privacy as distinguished from technical planning, which can then fall once the policy is set. Although I certainly agree that the use of automated techniques can intensify the risk, provided the controls aren't there, I also think if the policy is there, the controls can be there and the environment can be provided.

The final issue is this: Do executives use data? Some do and some don't. Some people like to use measurement. Some people like to have their desks covered with reports; other people don't want to see data at all. They would rather talk to people and form their own qualitative opinions. The challenge for us in data processing is getting administrators to move from intuitive seat-of-the pants decision-making to using supportive data for quantitative decision-making. What's involved in doing that? What makes people use data? Why do people use data and why do people not use data?

In the Harvard study done by the Director of Financial Systems and Information Technology, the problem was summarized as basically three issues: acceptance, familiarity, ease of use. Certain managers will not accept the quantitative data. That's just their style. They feel they can make better intuitive decisions. Next, the degree to which managers will use data is dependent on their familiarity with data and with data processing. If they understand data processing, if they understand systems planning and priority setting and the reason why information systems were developed within their organizations, if they haven't been left out of the design process by not being talked to or involved in the planning--if all those things are true, then they will use data because they are familiar with all that is going on within their institution or organization.

Finally, the major issue that concerns us at IBM is ease of use. The degree to which the manager uses data is directly a function of how easy it is for his or her personnel to use data. The Commissioner of Education in Connecticut said in a speech two months ago: "While the State education agency does collect reams of data, information is not accessible in the form which enables State education officials or State legislators to use it." Some of the quotes from the Harvard Study were these:

The Dean never bothers with the official monthly budget reports. Their tardiness renders them useless.

Data produced regularly did not arrive in time to be employed for meaningful management and control.

The manager had trouble identifying any existing trends and patterns.

Data processing kept purging the files. No historical aata was available.

With reliable monthly data, he might have had three months lead time.

IMS's are strikingly inflexible relative to fast-changing environments of executive decision making.

The views these executives have of data processing are quite disturbing. We all take pride in what we do in data processing and we have all prided ourselves in serving management. So what is the problem here? Ease of use. But that is a problem we in data processing can tackle. If data is easy to use, more managers will use it, and more will become familiar with it, and the flexibility of it will become accepted.

How do we attack the problem of ease of use? There are two ways we have seen people attacking the problem. One of the ways in data processing is the increasing use of what we call "interactive query facilities." Query facilities mean question-asking facilities. The ability for the manager, the assistant to, the staff assistant, the budget planning analyst, the finance committee analyst, the assistant superintendent, to sit down at a terminal and communicate with the data in English without writing programs. For retrieval, selection, computation, sequencing, formating--all the things that the executive wants to do with it. Now some of us call that playing with data, but what we're saying is exercising data. We can exercise the data in one of three ways: instant terminal response, hard copy response right after the question's asked, or deferred processing. Any of these options are available so people can time and tune the facility to what they want in terms of response.

One of the things an executive will do is look at visibility of results. If we're down there in those basements building operational information systems which no one sees for three years, the funding does not continue for those efforts. How do we demonstrate results to management when we go in there and say we are going to have a three-year plan for that new financial system, and we don't come back with anything for three years. Successful examples of systems in operation help. For instance, the Oakland Schools in Michigan, a large school district, is using a query facility in the financial area--they are doing financial reports, queries, and retrievals. When we asked them what the major benefit was, they responded: "Life is a lot easier between data processers and the users. We're now able to serve all those quick demands that they put upon us."

Unfortunately, much of the output of what management does ends up in the wastebasket. Trying to tell a programmer that his little two-month project ends up there is a very emotional thing because he prides himself in that development. Now there are two arguments here. The first argument is that we in data processing have to educate management to tell us what they need. And that's a problem

which is a consequence of the environment. A chief officer or State superintendent frequently does not know what he will need tomorrow or next week because of the way the questions are coming in from Washington, from the State, and from the communities. The theory is that management today spends more and more time planning, and in support of planning, the computer is being used a lot for forecasting and modeling, for cost accounting, etc. We have seen a real growth of computer planning tools: the balance sheet projections, the budget salary plans, enrollment forecasts, resource allocations, long-term plans, facility analysis, and those kinds of things. It is now easier for management to access the data base, to format and edit the data, to do arithmetic computations, output formating, and graphing and charting of the data. The computer can do all of those things.

But we in data processing have to put in perspective what the value of data is outside of displacing forms and replacing clerks. For years in data processing we have been building separate applications to automate different areas. We've been building applications in finance for Division X and Division Y, personnel for Department A and Department B, students for Units C and Location K, and so forth; and those applications today have proved to be difficult to interface, are redundant, and difficult to develop. Terminals allow us to decentralize the input and use of data, since we've locked it up in that data base. And through the use of data communications, we can make the user a little less afraid of a data base and of integrating with data and of taking data away. Management and planning functions need the data base. They need the data communication facility, a very visible, dollar-justified part of the function that gives value of data to agency management as distinguished from volume of paper turned out.

DATA AS THE CENTER OF THE UNIVERSE

by

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When we talk about data-based systems--the problems of building information systems today--I'm reminded of the two major problems identified in Alvin Toffler's Future Schock: the problem of over-choice and the problem of accelerating rates of change. We've got so many things that we can potentially do today--stay home and watch TV, go to the movies, play golf or tennis. In every way, shape, and form of life there are now so many choices that we just don't know what to do. Over-choice has caused some major psychological problems, according to Toffler. Accelerating rates of change have also caused problems. Toffler indicates that humanity--as we know it today--has been on the face of the earth for about 800 lifetimes, assuming an average lifetime is about 60 years; and it's only in the last three lifetimes that most of the inventions and everything that we know has been available. In an accelerating rate of change every day gets faster. For example, we build huge public schools, or churches, or whatever, expecting people to be there for 50 years--as they have always been. No sooner do we get the school built than the population center moves. Either major industry shuts down, or overcongestion develops, or people don't like the cities and move out. What was adequate just a few years ago is no longer adequate. The same situation obtains in data-based systems and information systems. We're bewildered by this harmless over-choice. There are so many ways to go, so many different situations to appraise.

The problems of building information systems are somewhat like the problems astronomers faced years ago. Up until the time of Copernicus, the civilized world understood the planets, the sun, the stars--everything--revolved around the earth. The earth was the center of the universe, and all knowledge was predicated on concept. But as the astronomers tried to predict the seasons or compute where the stars and the moon would be, they found their results were always out of balance. They did not discard their faulty premise, however. They just kept making adjustments. They said, "Well, our instruments aren't quite accurate enough; our knowledge isn't quite accurate enough. We'll plug in this adjustment factor, and make this modification. Close is good enough."

Copernicus rejected that argument. He reflected that possibly the sun was the center of our universe, and perhaps the earth and the other planets were revolving around it. His computations proved him to be completely right. Unfortunately for him, his works were proscribed during his lifetime because people refused to believe the earth was not the center of the universe.

In a sense, data-based systems are the same way. The concept of everything revolving around the data--the data being first and foremost, and not the operating systems, or the hardware, or the compiler--is a necessary foundation on which to build information systems. But, just as in the Middle Ages, many people are not geared up to accept it. Their expertise or their reason is based on some other premise. The fact of the matter is, however, that just as the sun is the center of the universe, the data base is the central item in information systems--all care and attention needs to be focused there.

Building information systems reminds me of the classic, Charles Dickens' A Tale of Two Cities, which begins: "It was the best of times, it was the worst of times . . . ." In data processing and information systems today we hear that. It is the best of times. There's opportunity to do more. Our knowledge levels, our capabilities, are proving information--it's never been better. On the other hand, the problems we face are major. The cost of building big information systems is prohibitive, and trained people are very scarce. Pressures for producing results are tremendous; yet we're bogged down by much of what we have done in the past. We've already built information systems that we have to maintain, and we're retarded by past decisions made when we didn't realize how things were going to change.

In order to comprehend our present predicament we need to know where we've been, how we got there, and what caused it to happen along the way. Briefly, first came a major emphasis in the growth of computer application development--payroll, billing, accounts receivable, etc. Then the specializations emerged which required programmers, operating systems experts, systems designers, and so forth. Finally the management techniques appeared.

The very first phase in building computers occurred in the area of accounting and accounting systems. Computers were justified heavily on the basis of cost reductions. We could go into the senior management and say, "With this new computer we can eliminate all these clerical people over here. We can cut costs." Management bought that because they wanted to have a computer to satisfy their egos, and if you could show them how to cut costs and save money as well, they were happy--and so they bought the computers.

The primary emphasis in those early days was on computer efficiency--using languages and compilers to get more mileage out of the computer. Storage was very expensive, and we used to spend time rewriting old operational programs just to reduce the size of the equipment we needed. At that time the programmers themselves were the managers; management techniques were unimportant. Many of them ran around with the punch cards in their shirt pockets. The documentation was in their heads or scratched on the front of an old paper bag. It was very easy to bring in the computer and reduce clerical people because the computers were very powerful compared to typewriters and accounting machines. No one mentioned that those people were turned into key punch operators or programmers so the costs were moved from Department A to the computer department. The initial empire-building of computer departments had begun.

The computer itself was very little utilized in those early phases. In time, management said, "Hey, this is a major piece of equipment. We're paying thousands of dollars a month for it, and we should be using it intensively--three shifts a day, seven days a week." With this kind of management interest, we rapidly moved into the second phase of specialization--the contagion phase--when the computer started spreading into the other departments. In this particular phase the emphasis was on proliferation of applications to all functional areas. We started out justifying it on payroll, but we got into building and order-entry and inventory control, and into any area where someone would listen to us. At the time, we plotted the availability of time left on the computer in months, and we used to go to management and say, "Look, we're running out of time. We need more computers." Management agreed because we were reducing costs. No one looked at the cost in data processing.

We then entered into the third phase. The problem here arose in those companies where the president's son-in-law graduated from the Harvard School of Business.

He was being paid more than the corporate controller, and the president didn't know what to do with him; so he called him an assistant and got him involved with the fancy computers and the study and justification teams. He was invited to all the meetings, but no one paid any attention to him. They'd be computing their costs, and he'd be sitting in the back of the room. He discovered that according to his computations with all the programmers, the costs of air conditioning, room space, and everything else, the company was spending not $30,000 a month but $250,000 a month.

Because of him we moved into the control phase. We had to cut costs in data processing instead of spending more money. We then began to bring in all kinds of techniques for control effectiveness, and management moved into a very control-oriented environment.

At the end of this phase, during 1969, 1970, and 1971, we began to move into the data-based concept. Here the emphases were on specialization of data-based technology, on-line systems, and resource-oriented planning and control management. This phase was what we might call the integration phase.

That is where we are today, and I'd like to take a look at that from an organizational point of view, from a technical point of view, and from an environmental point of view.

First of all, from an organizational point of view data processing has carved itself out a permanent niche in the power structure of most corporations and businesses. Presidents no longer have the guy whom they didn't know what to do with so they put him down in the computer room. He is now a major executive in most corporations. Data processing is now responsible for managing the data.

From a technical point of view, different programs require different data, but maintaining redundant data incurs tremendous excess programming costs. This is a major reason why we have seen costs skyrocket in the area of software and software development and maintenance. The traditional approach of everyone's having his own alphabet created the problem of redundancy. The data-base approach says, "Hey we have one set of data. It is going to be managed as a resource should be managed. We're going to all share that same data." We want to stop this universe of data from multiplying exponentially. We want to look at our data bases as a data repository, just like a library. What we want to have is a library in which everyone doesn't have to have ten million books, but he can go and pick out the books he wants to satisfy his current requirements--and those books are going to be up-to-date and well cared for by the library. In order to do that we must organize that library so we can locate the data we need.

Data-based systems and data-bases are really separate data; but they are integrated by common threads or directories. It is very critical to remember that data must be separate data and separate data bases, integrated.

From an environmental point of view, we have a major backlash of IMS. Most companies, firms, and organizations have spent fortunes on systems which have delivered few results, and management is fed up to its ears with promises. That is an environmental situation we must cope with. The other one is the low-level operational systems fixation. What do I mean by this? It means that we spend our time worrying about single applications, mistakingly thinking that

When we get them all together, we're going to have that big information system, and we're going to do all kinds of statistical analyses and testing of probability. It will never happen.

The senior management technician syndrome is the chief environmental problem. Data processers often complain, "We have to get top management committed. We have to get top management involved." But it's the data processing department's responsibility to go out to senior management, to the un-users, not the other way around. The world does not revolve around our computers, our technology. Data processing people have for years been deluded. Basking in their own success and glory, they think that people need to get involved in their world. That is completely wrong. The computer exists to satisfy the needs of the business or the organization.

One of the big reasons why we have continued to focus on management is that the low-level personnel don't have to confront the big power structures in the corporation. They can avoid all kinds of political show-downs; and because there are still major unexploited opportunities in operational systems, they can still show cost justification, save the corporation money, and get more computers or more people based on that. These are the reasons why we stay fixated there. The dangers of this stasis are that we get tremendous imbalance of application emphasis and very little corporate and integrated information. Our technology lag is unbelievable. We're so far behind the potential of what we could do with computers, it's appalling.

Finally, there exists a major mismanagement of corporate data reports. What do we need to do? First of all, we can orient ourselves around the data-base approach. Second, we need to say that data is our responsibility to manage as data processing people. We will develop a function around that, and we will develop a strategy for managing that resource.

Let's take a look at strategy for managing the data resource. What is a data base? Is it a concept or is it a tool or is it a software package? What is it? Our answer is that it is both. It is not only a concept, but it is a tool or a series of tools--software tools. It is also an implementation approach. I might also say it is a matched set of tools--all integrated and working together. Just as the highway builders need trucks and plows and everything else to build highways, we need software tools to build information systems.

I'm not trying to sell you on buying them. You can build them yourselves, but you must take an approach similar to this. You must insulate yourself from the operating system. You must build on-line control systems to manage the terminal network. You must build data-based management systems. You must build some type of report writing system. Notice every one of these exist between your application and the operating system. They also reduce the work of developing those applications by great orders of magnitude. Application development can be reduced by 80 to 90 percent by using this type of approach.

Since you are sitting between the operating system and the equipment and hard-ware, your applications are being written in COBOL. This is available through all vendors and all releases and is pre-standardized now. With IBM you can move from DOS to OS, or from DOS to VS or FS and Q and the future systems, and so forth, without major program conversion and impact. You can move to new releases of the operating system, the hardware, new applications, without des-troying the old investment you have made. You can share data across different types of computers--the IBM computers, control data computers. You can have large-scale computers and small-scale computers in the same system doing this kind of approach.

You also need to be able to logically represent the information flow throughout your company or organization. You must be able to visualize it and write it down. Obviously that means you need to go out to the un-user and find out. If you have taken that approach, if you have realized that data base is an organizational, emergent function here, if you have relieved yourself of much of this work of programming and technical virtuosity, you can now get out of the brierpatch, go out to the un-user, and begin serving and supporting and helping him.

In addition you need to have some type of methodology organized in your company. You need to develop a plan of action, of implementation, that people will follow. Your computer people will not like this. They want to systematize everybody in every department except themselves. They don't like time frames, they don't like plans of action, they don't like target dates, they don't like corporate company standards, they don't like any discipline. Yet, there is no chance of succeeding until you get methodology invoked in your organization.

The data-based concept says that data is first of all a raw material that we can build with. It is meaningless by itself. Let me give you a couple of pieces of information or data--"36-22-36." I've just given you some data, and I've associated that data in your mind with other data, and all of a sudden you have an image in your mind. Some of you are already preparing to take action based on that. Let me give you additional data. "She's rich, she's out in the lobby, and at lunch she asked me about you." Now your action plan is almost certain. And let me give you some final information. "She's 77 years old, she has a drinking problem, and she's mean." So, data is just data. You need to add it together to get more information. Information is created. I have done it for you by relating that data within some concepts, for the purposes of communicating information.

You don't create information systems to replace clerical people. If you are doing it for that reason, there is no sense in going into data-based systems because it is probably going to cost you more. Data-based systems are designed to store raw data as it is being created in the business, and it is maintained in that pure form--we don't summarize it. The data-based concept means that we keep the raw data in pure form and we relate to context. We use it later for generating information.

How does this concept differ from what we are doing? Historically, systems have been designed to store information at a defined point in time within a specific concept and for a specific user. These systems can not easily accommodate new users, they can't incorporate any new information needs, and they can't adjust definitions of information or be expanded. The kind of equipment we developed in the old days was slow and expensive. Programming language required each program to restore, retrieve, and analyze its own data. Data couldn't be shared commonly. But we do know better today, and there is just no sense in proliferating.

EVALUATION

REGIONAL INTERSTATE PLANNING PROJECT
JULY 1, 2, 3, 1975
HELENA, MONTANA

Evaluation of the conference proceedings was conducted by the Finance, Planning, and Evaluation component of the Montana Office of the Superintendent of Public Instruction.

The 53 evaluation forms returned represent approximately 83 percent of the individuals attending the conference. The high percentage of return on the last day of the conference is owed to the fine feel for evaluation held by Lamar LeFevre and his Las Vegas associates. Forms were received from representatives of 15 states, the Council of Chief State School Officers, and the National Center for Education Statistics. The respondents classified themselves as 28 percent (15) top managers, 43 percent (23) EMIS on mid-management, 16 percent (9) technicians, and 11 percent (6) others. In most cases, there was little difference in ratings between the categories of respondents.

Overview

The conference format was planned to encourage interaction and involvement within each State group. Ninety-seven percent of the evaluations rated this goal as having been achieved. Comments were highly favorable toward the conference format with the most frequent complaint being the lack of time allowed in the small group sessions.

Section I - Policy Issues - Utah

Over 90 percent of the respondents rated this section of the conference as dealing successfully with the issues and encouraging interaction. Selected comments were:

I still feel there was no documentation of decision making stated.

Specific action steps were agreed upon to be taken during the balance of the conference after returning to Texas.

Texas will profit. Heaven knows we need it.

A very good presentation.

Too structured.

Our State group had time to discuss the topic and make some decisions.

Presentation and small group discussion guide stimulated involvement, and the structure of small group discussion aided State teams in their planning to guide future activities.

Well prepared and presented.

Section II - Data Collection Issues - CEIS

Approximately 80 percent to 90 percent of the respondents rated this section of the conference as meeting the objectives of covering issues and stimulating interaction. Selected comments were:

The State team discussion was very productive and was aided much by consultation by Jim Mitchell.

Gave direction.

The presentation was broader than the topic titles. Perhaps he could have zeroed in on the specific area.

Jim Mitchell did an excellent job.

Presentation was largely old cliches--many of which were wrong.

Section III - Data Processing Issues - Texas

Approximately 80 percent to 90 percent of the respondents rated this presentation as meeting the criteria of covering the issues and stimulating interest and involvement. Selected comments were:

This was the weakest point of the conference. I expected detail and got generalities. I felt this was a deterent not an enhancement.

This session produced a very candid objective interaction which brought out several future actions and top management commitments.

Texas presentation was very helpful.

Decision making level not present in most cases.

Not as practical, but interesting and informative.

Section IV - Data Utilization Issues - Colorado

The results of this session are incomplete as some of the activities were not completed at the time of the evaluation. However, the initial presentation was made prior to evaluation and 93 percent of the respondents rated it favorably. Selected comments were:

IBM oriented--(super salesmanship!!!)

Not much time for discussion on this topic.

Presentation was very good until it moved to promotion of 'Query'.

IBM representative appeared to be too sales oriented in his presentation.

Summary

In general the evaluation and comments were very favorable to the organization of this conference. Participants felt that meeting as State teams and including different levels of staff was most productive. However, in the future, careful consideration should be given to allowing sufficient time for small group meetings.

QUESTIONNAIRE

I. Demographic Data

1. Check the appropriate blank below:

a.	local school district personnel	2
b.	education service center personnel	2
c.	state education agency	24
d.	colleges and other institutions of higher education	
e.	state or local school board member	
f.	student	
g.	other	
		28 TOTALS

II. General comments: (Circle an appropriate number.)

1. What was your initial attitude about attending this part of the conference?

	1	11	14	26
1	2	3	4	
very negative			very positive	

2. In terms of the contribution to the solution of data processing problems the workshop was

	5	17	4	26
1	2	3	4	
very unsatisfactory			very helpful	

III. Presentation of Tom Nies:

a. the scope/content of the presentation was

	5	9	12	26
1	2	3	4	
irrelevant			highly relevant	

b. the material presented was

2	10	11	3	26
1	2	3	4	
very general			very specific	

c. the material presented was

	4	10	11	25
1	2	3	4	
too technical			appropriate for the group	

d. the presentation was

	5	9	12	26
1	2	3	4	
difficult to understand			clearly communicated	

IV. The panel discussion:

a. the scope/content of the presentation was

1	8	15	3	26
	2	3	4	
irrelevant			highly relevant	

b. the material presented was

1	9	14	2	26
1	2	3	4	
very general			very specific	

c. the material presented was

1	11	10	4	25
	2	3	4	
too technical			appropriate for the group	

d. the presentations were

1	4	17	4	26
1	2	3	4	
difficult to understand			clearly communicated	

V. Please evaluate the usefulness of the State Small Group Team Conference.

a. How useful were the discussion questions?

1. Were they useful in stimulating constructive team interaction and problem solving? (20) Yes 18 No 2

2. Were they relevant to your perceived problems? (21) Yes 18 No 3

b. How useful was the period to your State Team

1. Were you able to make constructive use of this period in identifying EMIS problems? (21) Yes 19 No 2

2. Were there any specific actions or decisions obtained during or as a direct result of this session? (19) Yes 13 No 6

VI. List below any additional suggestions or comments.

Each of the following comments was listed once on the evaluation forms.

1. I would have appreciated someone giving an example of how they used the existing "information system" in reaching a decision. Give an example of the type of decisions they expected to make. Give some examples of their policy statements, and in general move more from the abstract to the concrete.

2. I would like to see actual examples of the implementation and utilization of a data base.

3. In reference to Section V: It would be beneficial to have at least one more of these group meetings.

4. There were several issues listed on the program outline that were supposed to be covered and were not.

5. Yes. Please cover other aspects of data processing issues as per the conference outline.